Abstract Submitted for the DPP19 Meeting of The American Physical Society

First order Phase Transition in DC discharge Complex Plasmas¹ HARIPRASAD MG., SARAVANAN A., GARIMA ARORA, PINTU BANDY-OPADHYAY, ABHIJIT SEN, Institute for Plasma Research, India — We report the first order phase transition in a strongly coupled two-dimensional DC discharge complex (dusty) plasma. Experiments are carried out in Dusty Plasma Experimental (DPEx) Device in which complex plasma is produced by using mono-dispersive MF particles in the background of a DC glow discharge Argon plasma . An explosive full melting of the dusty plasma crystal is observed with a negligible decrease in neutral gas pressure (0.1 Pa). The dust temperature dramatically increased to approximately 50 eV from 2 eV and the Coulomb coupling parameter changed to approximately 7 from 220. Structural analysis of two-dimensional crystal and liquid is carried out through a number of analysis like pair correlation function, Voronoi diagram and Delaunay triangulation. The balancing of dust neutral collision and the vertical oscillation of the dust crystal is understood as the mechanism, which drives the phase transition.

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Date submitted: 03 Jul 2019

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